

Faecal marking behaviour by free-ranging Common genets *Genetta genetta* and Egyptian mongooses *Herpestes ichneumon* in southwestern Spain

By F. PALOMARES

Estación Biológica Doñana, Consejo Superior de Investigaciones Científicas, Sevilla, Spain

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Abstract

Studied defecation behaviour of the common genet and the Egyptian mongoose at the Doñana National Park from November 1985 to November 1989. Both species frequently used latrines and more than one individual contributed to latrine formation. Genets placed their latrines in trees situated on the edges of the more frequently used habitats, whereas mongooses defecated on the ground, and their latrines were found within preferred habitats, near to resting sites. Genets increased their marking behaviour in February–March and November–December, and mongooses in January–February and September–October. Latrine switching within the same area was observed in mongooses. Data tend to indicate that latrines are used as a communication tool in both species.

Introduction

Faeces seem to be used by many carnivores as a communication tool in their social lives (MACDONALD 1980; GORMAN and TROWBRIDGE 1989). Nevertheless, little is known about faecal or scent marking behaviour in viverrids (GORMAN and TROWBRIDGE 1989), the only studies being on free-ranging civets, *Civettictis civetta*, (BEADER and RANDALL 1978) and captive African dwarf mongooses, *Helogale undulata*, (RASA 1973), meerkats, *Suricata suricata*, (MORAN and SORENSEN 1986), water mongooses, *Atilax paludinosus*, (BAKER 1988) and common genets, *Genetta genetta*, (ROEDER 1980a). Furthermore, faecal marking behaviour is discussed only occasionally in some of these studies. Here, some aspects of faecal marking behaviour by free-ranging common genets and Egyptian mongooses, *Herpestes ichneumon*, in the Doñana National Park (southwestern Spain) are described.

Study area

The study was carried out in two areas of the Doñana National Park: the Biological Reserve and the Coto del Rey. The Park is situated on the western bank of the Guadalquivir River mouth, in southwestern Spain (approximately 37°N, 6°30'W), and includes three main biotopes: marshes or marismas, scrubland and dunes. The marshes are usually flooded in winter and covered by *Scirpus* sp. There are two main types of scrubland: a dry, xerophytic scrubland vegetated by *Halimium* sp. and *Rosmarinus* sp., and a dense, mesic scrubland with *Erica* sp. and *Calluna vulgaris*. There are scattered cork oaks (*Quercus suber*) all over the scrubland. In the dunes, there are mobile bare sand dunes with valleys between, which typically are colonized by pine (*Pinus pinea*) forests. The climate is Mediterranean subhumid, characterized by dry, hot summers and mild, wet winters.

The Biological Reserve (6700 ha) is situated in the middle of the Park, and the three main biotopes described above for the Park can be found. The Coto del Rey, of 3500 ha, is situated in the northern part of the Park, and is characterized by pines and *Eucalyptus* sp. forestations on the matorral, and abundant *Pistacia lentiscus* patches where the ground water table is nearer the surface.

Material and methods

The Biological Reserve was examined fully for genet defecation sites, special attention being paid to trees and *Erica* and *Calluna* scrubland (the main habitat of the species in the study area; PALOMARES and DELIBES 1988). By contrast, three areas of the Biological Reserve (Caño de la Raya = CR, Lucio Bolín = LB, and Laguna Santa Olalla = LO), where mongooses were radio-tracked (PALOMARES and DELIBES 1991a), were examined for mongoose faeces. Greater searching effort was undertaken from November 1985 to January 1986. Each defecation site was marked on the terrain. A site was considered as a latrine if there were 2 or more faeces. Latrines were periodically sampled (weekly from November 1985 to April 1986, and monthly from then to January 1987). In total, 264 and 141 samplings were carried out on genet and mongoose latrines, respectively. Radio-tracking at the Biological Reserve of 2 genets (an adult dispersing male, and a young female) and 4 mongooses (2 adult and 2 young females) from September 1985 to April 1986 (PALOMARES and DELIBES 1988, 1991a) helped to interpret some of the results on faecal marking behaviour. Habitat type where latrines were found and their situation with respect to places commonly used by radio-tracked individuals were noted.

All faeces were collected for diet analysis (PALOMARES and DELIBES 1991b), but their number and position were noted before collecting. To test possible influences of faecal removal on genet marking behaviour, some faeces were left at the latrine on 64 sampling occasions, whereas in another 200 occasions all of the faeces were collected. Removal did not affect presence or absence of faeces on the following sampling occasion (G-test of independence; $G = 0.002$, $p < 0.001$).

Genet latrines were also intensively searched for during June 1987 in the Coto del Rey. Sporadic information on marking behaviour of both species was also obtained from March 1987 to November 1989 while radio-tracking 24 mongooses and 10 genets and collecting faeces for scat analysis in the same area (PALOMARES and DELIBES 1991a).

Results

Both genets and mongooses made latrines. Twenty-seven genet defecation sites were found on the Biological Reserve, with a number of faeces ranging from 1 to 27. Seven of these sites contained only 1 scat; fifteen were periodically sampled. More than one genet seemed to use the latrines. The radio-tracked male was trapped at latrine 320, which was continuously used (Tab. 1) despite the fact that this individual never returned to the area during 5 months of radio-tracking (Tab. 1).

Forty-one mongoose defecation sites were found on the Biological Reserve, with a number of faeces ranging from 1 to 40. Twenty-one of these sites had only 1 scat; fifteen were periodically sampled. Different mongooses also deposited their faeces on the same latrine. On 6 January 1985, 2 mongooses (an adult radio-tracked female and an untagged animal) left 3 faeces a few centimeters from each other, close to a resting site. At the Coto del Rey I observed numerous latrines used by different mongooses belonging to the same family group.

Defecation site ground

Genet faeces were found in trees (44.4% on main trunks, 22.2% on secondary trunks, 14.8% on raptor nests and 7.4% on tree branches), on thickets or hedges (7.4%) and on the ground (3.7%; $n = 27$ sites). Faeces in trees were situated on average 4.2 m high (SD = 2.8, range = 2.5–14.0, $n = 22$). Trees were always cork oaks except for one pine.

When using latrines, genets tended to deposit faeces over the whole available surface and, as a rule, fresh faeces were never deposited over other fresh ones, although over old ones. The only latrine found on the ground had 9 faeces deposited over semifallen rush bushes with the furthest separated by 25 m.

At least 100 cork oaks were searched for genet latrines in the Coto del Rey, but none were found. On the other hand, only 3 latrines (with 3, 6 and 21 faeces) used for a few days were found in this area during radio-tracking activities. Scattered faeces were sometimes found, all of them situated on the ground.

Table 1. Number of faeces by month and latrine in common genets from November 1985 to January 1987

Latrine number	Months														
	NO	DE	JA	FE	MA	AP	MA	JU	JU	AG	SE	OC	NO	DE	JA
320	20 ^a	7 ^a	4	5	4	3	2	2	1	3	23	18	8	2	2
215	3 ^a	0 ^a	0	0	0	0	0	0	0	0	0	0	1	0	0
204	0 ^a	2 ^a	1	0	1	0	0	0	0	0	1	0	1	2	3
308		19 ^a	4	0	0	0	0	0	0	0	0	0	4	7	1
306		8 ^a	2	3	2	1	1	4	0	0	0	0	0	0	0
314		5 ^a	0	2	0	0	0	0	0	0	0	0	1	0	0
210		3 ^a	1	0	1	0	0	0	0	0	0	0	1	0	1
415		3 ^a	0	2	0	0	0	0	0	0	0	0	0	-	-
281		9 ^a	1	8	0	0	0	0	0	0	0	0	0	0	0
200		6 ^a	0	0	0	0	0	0	0	0	0	0	0	0	0
300		27 ^a	4	12	4	3	1	6	0	0	1	3	7	4	
261		8 ^a	3	1	0	0	0	0	0	0	0	0	0	0	
418		14 ^a	8	4	0	0	3	13	1	0	1	2	3	2	
388						3 ^a	0	0	2	0	2	8	7	4	
282								4 ^a	1	0	0	0	0	0	
Mean			1.5	2.2	2.5	0.6	0.4	0.7	1.4	0.5	1.6	1.5	1.9	2.0	1.2
SD			1.7	2.4	3.7	1.3	0.9	1.3	3.7	0.9	5.9	4.6	2.7	2.9	1.5

^a these data were not used to obtain the monthly mean.

All mongoose faeces were found on the ground. Of 17 latrines, 35.3 % were by bramble edges or other thick vegetation; 23.5 % under this same thick vegetation; 17.6 % under pine shrubs, but clearly visible; 11.8 % over flattened grass and surrounded by rushes, *Juncus* sp.; 5.9 % on paths among vegetation; and 5.9 % at an open ground elevation in the middle of a pool. Most of the detected latrines (76.5 %) were in clearly visible sites, whereas 23.5 % were hidden. However, dense vegetation probably made it difficult for the observer to find the latter. Scattered faeces were mainly found on the middle of paths within the most used habitats and on those leading to resting sites.

In mongooses, latrine surface sizes varied greatly, from those with faeces separated by a few centimeters, to others where there was a continuum of faeces with the furthest separated by 45 m.

Place of latrines

Genets mainly inhabit mesic scrubland patches in the Biological Reserve (PALOMARES and DELIBES 1988) and preferentially deposited their faeces on the edges of these patches (69.2 %; $n = 26$; $X^2 = 3.85$, $p = 0.0498$). Inside the 1.4 km² of the female home range (the only individual that had a defined range; PALOMARES and DELIBES 1988), three latrines were found, situated by the edges of mesic scrubland.

Mongooses use mesic scrubland and brambles (*Rubus* sp.) to rest (PALOMARES and DELIBES 1990) and most faeces were found very near or inside this habitat. Thirteen of 17 latrines (those with higher number of faeces and used longer) were less than 50 m from known nocturnal resting sites and inside home range core areas of radio-tracked individuals. During intensive 24-hour tracking periods mongooses were observed on 5 occasions defecating close to resting sites. The number of latrines in the home ranges of the three most radio-tracked mongooses were 6 (home range of 1.7 km²), 7 (home range of 4.8 km²) and 2 (home range of 5.7 km²).

Temporal pattern of latrine use

On average, the number of faeces at genet latrines was higher in February–March and November–December, and lower from April to August, with a slight increase in July (Tab. 1). Of 15 latrines periodically sampled, only 5 were continuously used for at least 4 months, and only 1 was always used (Tab. 1). Two latrines (one with 9 faeces on the ground and another with 15 faeces in a raptor nest) made by the radio-tagged male while roaming by the dunes were located. They were close to resting sites. When resting sites were deserted, the latrines were not used any longer.

Numbers of faeces on mongoose latrines were higher in September–October and February, with lower but similar numbers for the rest of the year (Tab. 2). Usually mongooses did not keep latrines for long. Latrines were commonly used during an isolated month, or at most, for 2 or 3 consecutive months, although after a time they could be re-used. Two latrines were used during 7 months (Tab. 2).

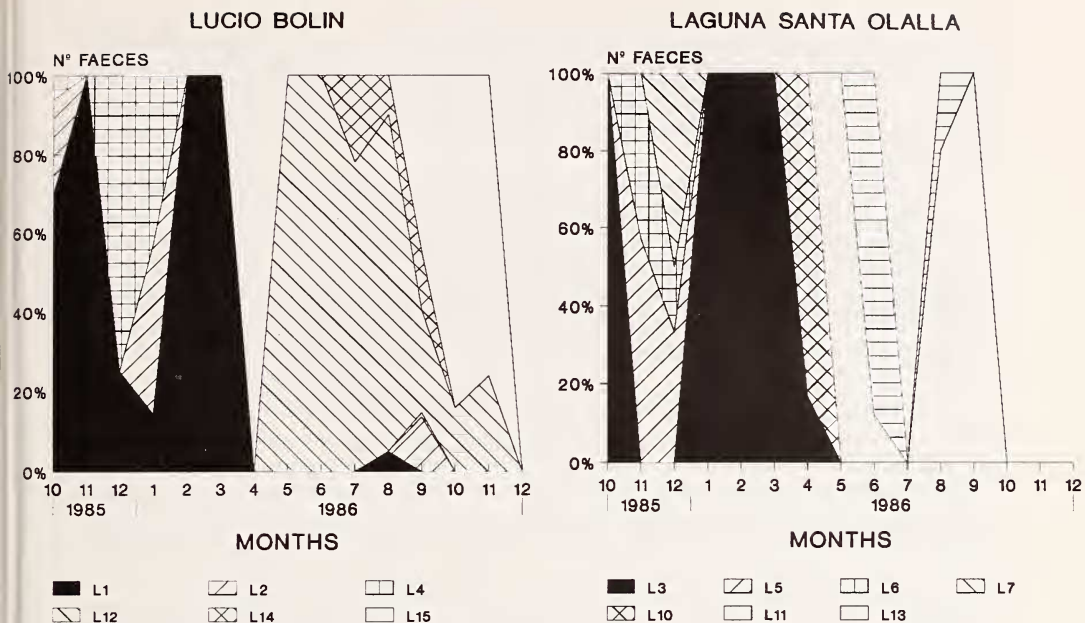
Table 2. Number of faeces by month and latrine in Egyptian mongooses from November 1985 to January 1987

Latrine N°	Place	Months														
		OC	NO	DE	JA	FE	MA	AP	MA	JU	JU	AG	SE	OC	NO	DE
1	B	23	2	2	1	1	1	0	0	0	0	1	0	0	0	0
2	B	8	0	0	3	0	0	0	0	0	0	0	12	0	0	0
3	O	3	0	0	1	1	1	1	0	0	0	0	0	0	0	0
4	B	2	0	6	3	0	0	0	0	0	0	0	1	0	0	0
5	O		4	2	0	–	–	–	–	0	0	0	–	–	–	–
6	O		3	1	0	–	–	–	–	0	0	0	–	–	–	–
7	O			3	0	–	–	–	–	0	0	0	–	–	–	–
8	CR				20	0	0	0	0	0	0	0	0	0	0	0
9	CR					26	13	9	0	0	0	0	0	1	0	0
10	O							5	0	0	0	0	0	0	0	0
11	O								11	3	0	4	1	0	0	0
12	B								9	6	32	17	23	6	5	0
13	O									22	0	1	–	–	–	–
14	B										9	2	13	0	0	0
15	B												40	32	16	^a
Mean		9.0	1.5	2.0	3.5	4.7	2.5	2.1	2.2	2.4	2.9	1.8	8.2	3.5	1.9	0.0
SD		9.7	1.8	2.1	6.8	10.5	5.2	3.5	4.4	6.2	8.7	4.5	13.5	9.6	4.9	0.0

B = Lucio Bolin, O = Laguna Santa Olalla, CR = Caño de la Raya.
^a Latrine was flooded.

Latrine switching by mongooses

Mongooses seemed to use latrines alternatively on a same area. For instance, at Bolin, latrine 1 was the most used from October 1985 to March 1986, together latrines 2 and 4; latrine 12 was the most used from May to August 1986, and although mongooses never stopped defecating on latrine 12, latrine 15 was the most used from September to November 1986 (see Fig.). At Olalla, latrines 3, 5, 6 and 7 were the most used from the beginning of the study to April 1986, but from May on, only latrines 11 and 13 were used (Fig.).



Monthly contribution of each latrine (L) to total number of faeces collected of Egyptian mongooses in Lucio Bolin and Laguna Santa Olalla, both in the Doñana Biological Reserve

Discussion

The use of faeces for communication has been widely suggested in several carnivore species (MACDONALD 1980; GORMAN and TROWBRIDGE 1989), and this might be also the case for genets and mongooses since they used latrines situated at specific places. ROEDER (1980a) concluded that captive genets use their faeces for exchanging information, and HEFETZ et al. (1984) found a specific component in the substance secreted by the perianal gland of male Egyptian mongooses. The position of this gland around the anus, suggests that faeces may be impregnated with different odours at least between males and females. Mongoose latrine situation, near resting sites and inside core areas, suggests that faeces may be used as a self-recognition of the terrain, as territorial marking of core areas, which are exclusive among adult individuals of the same sex (PALOMARES and DELIBES 1993a), and to facilitate communication among family group members (EWER 1973; GOSLING and MCKAY 1990).

DÜCKER (1965) remarked that *Viverrinae* usually use permanent latrines, whereas *Herpestinae* tend to switch their latrines often. ROEDER (1980a) pointed out that genets use permanent latrines, a spontaneous latrine switch being very rare. In this study these tendencies were observed in genets and mongooses, although for the former it was observed more sporadically than permanent latrines. The formation of temporal latrines seems different in each species. Roaming genets such as the radio-tracked male, could be the cause in this species. With mongooses, it could be mainly produced by a contagious defecation by some mongooses travelling together, a frequent event in Doñana (PALOMARES and DELIBES 1993a). This could be ascertained on several occasions in the Coto del Rey.

Even lacking detailed information, the mongoose behaviour observed in Doñana does not seem to coincide with that reported by BEN-YAACOV and YOM-TOV (1983) in Israel,

where mongooses appear to use permanent latrines. In Israel, mongooses seem to use permanent resting sites (BEN-YAACOV and YOM-TOV 1983), but in Doñana they often change resting sites (PALOMARES and DELIBES 1993b). Since mongooses tend to make latrines near resting sites, this behaviour might explain such differences. Also in Israel, BEN-YAACOV and YOM-TOV (1983) found scattered faeces, which were ascribed to roaming individuals.

Defecation sites used by genets in Doñana (mainly trees) have been little reported in other areas, where rocks are the commonest (e. g. LIVET and ROEDER 1987). However, this difference is probably because rocks are not available in Doñana. On the other hand, an interesting finding was the different faecal marking behaviour found between genets living in the Biological Reserve and Coto del Rey. Habitat composition in each area is different, and therefore this might be the reason for the differences. Variations in marking behaviour attributed to habitat changes are frequent in other carnivores (MACDONALD 1980; SMITH et al. 1989; DELIBES et al. 1991).

Two annual peaks in the number of faeces at latrines were observed in both species. Those of February–March for genets and January–February for mongooses could be due to mating, which takes place at these times (AYMERICH 1982; PALOMARES and DELIBES 1992). Moreover, an increase in marking behaviour and inspection of scent marking during the mating period has been observed in captive genets (ROEDER 1980a, 1980b), and tigers (SMITH et al. 1989). The peaks detected in November–December for genets and September–October for mongooses could be caused by the dispersal of young animals in the former (see MACDONALD and MASON 1987, for the otter, *Lutra lutra*), and because mongooses travel more often in family groups at that time (PALOMARES and DELIBES 1993a), there being more individuals able to deposit their faeces at the same sites.

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Zusammenfassung

Markierung durch Defäkation bei freilebenden Ginsterkatzen, Genetta genetta, und Mangusten, Herpestes ichneumon, in Südwest-Spanien

Die Defäkationsgewohnheiten von Ginsterkatzen und Mangusten wurden im Nationalpark Doñana von November 1985 bis November 1989 studiert. Ginsterkatzen und Mangusten lagern ihren Kot oft in Latrinen ab. Als solche benutzen Ginsterkatzen Hohlstellen in Bäumen im Grenzbereich ihrer Habitate, während Mangusten ihren Kot am Boden ablagern und ihre Latrinen sich im Bereich des bevorzugten Habitats und in der Nähe von Schlafplätzen befinden. Ginsterkatzen markieren intensiver von Februar bis März und von November bis Dezember, und Mangusten von Januar bis Februar und September bis Oktober. Bei beiden Arten wird dieselbe Latrine von verschiedenen Individuen benutzt. Es scheint, daß Latrinen zum Informationsaustausch zwischen Individuen dienen.

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Author's address: Dr. FRANCISCO PALOMARES, Estación Biológica Doñana, Consejo Superior de Investigaciones Científicas, Avda. Maria Luisa s/n, E-41013 Sevilla, Spain